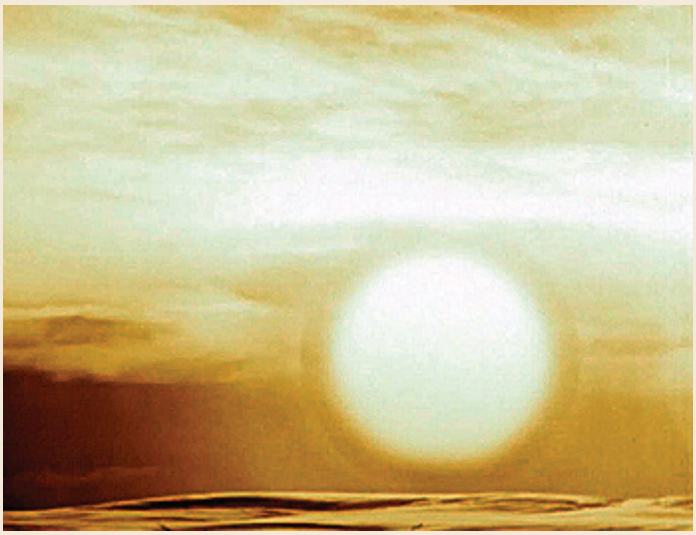
Bigger's Not Always Better



The largest human-made explosion in history was the Soviet Union's detonation (October 30, 1961) of its 50-megaton Tsar Bomba (the "King of Bombs"), the most powerful nuclear weapon ever designed (about 10 times the combined power of all the conventional explosives used in World War II). It had a designed yield of 100 megatons but was tested at half that yield, in part so that the plane that dropped it would have time to fly to safety. Due to its size and yield the Tsar made a huge, international political and military splash, but in reality it was impractical for military use. No more were built. (Photo: Open Source)

This may come as a surprise, but bigger yields are not always better. Nuclear weapons were generally designed not to be as powerful as possible—but to be as precise as possible.

For example, the Department of Defense (DoD) typically tasked Los Alamos to design and build nuclear weapons that produced the specific yield required to destroy one or several types of specific targets. Too little yield and the weapon would fail to destroy the target; too much and the blast would cause unanticipated, unintended, and/or undesirable consequences.

The weapon should, for example, have a yield whose subsequent effects would destroy the enemy's missile base but not harm the nearby town. From the U.S. perspective, the goal was to eliminate an adversary's ability to fight, not wipe them out. So the yield of U.S. nuclear weapons needed to be like Baby Bear's porridge: not too cold and not too hot, but just right.

The destruction caused by a nuclear weapon is also determined by the conditions under which it is detonated: on the ground, at different heights above the ground, underground, on the water, at different depths underwater, in the desert, in the Arctic, in the mountains, in a city, above a city, up in space, etc. The same-yield weapon—capable of releasing the same amount of energy—detonated in each of these environments will result in very different kinds and degrees of destruction. Sometimes a lower-yield weapon causes greater destruction than one with higher yield detonated in different circumstances. (See "The MX Factor," page 14.)

Solid Gold

It is a sobering fact that nuclear weapons designers, DoD strategists, policy makers, and disaster relief planners have derived much of what they know, or theorize, about the results of atmospheric detonations of modern nuclear weapons from the data taken from Hiroshima and Nagasaki and from the 210 atmospheric tests conducted between 1945 and 1963. Several factors make using those data problematic. For example, Hiroshima and Nagasaki did not resemble today's modern, concrete-dense, high-rise cities. And many weapons and yields were never tested in different environments against different types of targets.

The United States conducted approximately 800 underground tests after 1963, but the analysis of their destructive capabilities on real-world targets was limited.

Atmospheric tests provide the only "real world" test data for today's nuclear weapons scientists and national security stakeholders to work with. It may not be much data, but it is solid gold.

~Clay Dillingham